DOCUMENT RESUME

ED 214 335 EC 141 553

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TITLE Resource Allocation and Evaluation Model for Providing Services to the Multiply Handicapped in the Bergen County Special Services School District.
INSTITUTION Bergen County Special Services School District, Paramus, N.J.
PUB DATE [81]
NOTE 14p.

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Administration; Data Analysis; Data Collection; Decision Making; *Delivery Systems; Elementary Secondary Education; Models; *Multiple Disabilities; *Program Budgeting; Program Effectiveness; *Program Evaluation; *Resource Allocation; Special Education

ABSTRACT

The paper presents a model to assist administrators of special education programs for multiply handicapped children in making budgetary decisions and in evaluating therapy programs. The model's use requires that the efficiency and effectiveness of the various therapeutic services be measured and that the service needs of the multiply handicapped be identified. The model forces the user to collect data and perform analyses to allow prudent resource allocation and effective program evaluation. The problem with which the model deals is discussed in terms of efficiency, effectiveness, and equity. Ten terms used in the model (such as efficiency and prognostic indicators) are defined. The parameters and limitations of the model are discussed including the allocation of objectives and constraints. Nine steps in the implementation of the model are outlined. (DB)

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RESOURCE ALLOCATION AND EVALUATION MODEL

FOR

PROVIDING SERVICES TO THE MULTIPLY HANDICAPPED IN THE BERGEN COUNTY SPECIAL SERVICES SCHOOL DISTRICT

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BACKGROUND

While the annual average per pupil expenditure for regular education in the United States in 1980 was $1,819, the average per pupil expenditure for handicapped was $3,638.[1] These figures do not include costs involved in cases of due process, in transportation, and additional staff time.

The costs are even higher for the lower incidence handicapped special populations such as the multiply handicapped students educated in the Special Services School District of Bergen County, New Jersey. The Bergen County Special Services School District is a County-based regional public school district which provides special education and related services to handicapped students who cannot be appropriately served in their local school district.

There are many populations of students served throughout the Special Services District. Among these populations served are those deemed orthopedically multiply handicapped. Over the years, the per pupil cost for this population increased significantly to the extent that via former line item budgets records show cost of over $8,800 per pupil; via a more recent Program Oriented Budgets (P.O.B.) costs are estimated to be over $9,000 per pupil. The reason for the most recent cost increases via the new P.O.B. budget is related to the recent construction of a multi-million dollar facility for 89 youngsters which opened with an enrollment under that projected. In addition, two additional staff members, one expected to increase service frequency and one intended to individualize physical, occupational and speech therapy, were added.

THE PROBLEM

Numerous resource allocation questions are implicit in the above critical management situation. Models that assist in anticipating and controlling managerial decision-making are important towards resolving these questions.

In this paper there is a proposal for improving budget allocation and plans resolving program evaluations in a defensible way.

A review of research provides evidence of prior research of this nature. The Dikewood Study pioneered research into the human services resource allocation field.[5,6] In this study suggestions were made about the need to match the intensity of client needs with intensity of the needed resource. Literature pertaining to educational finance extends this concept to education.[7] A careful reading of these studies indicates that three resource allocation parameters must be explored in such investigating. These parameters are:

1. How do we maintain efficiency of related educational services?[8]

   Efficiency attempts to increase the ratio of service resource inputs to related educational service outputs. Inputs can be either dollars or labor hours while outputs are usually measured in direct hours of service received by the student. For example, for every half hour that a physical therapist spends exercising a student, he/she must spend an additional half hour with

1. paperwork and/or program preparation. If she/he is hourly and is paid $10 an hour, than direct service = ½ hour and ½ hour of preparation will still cost $20.

2. How do we maintain effectiveness of related educational service?

   Effectiveness measures how well the need for services is satisfied and adverse consequences are prevented.[9] It is suggested that effectiveness is measured as the ratio of service output to outcome (the improvement in the student's functional skills attributed to hours of service).

3. How do we maintain equity among related educational services?

   Equity[10] refers to the social fairness, the impartiality, or the equality of opportunity for equivalent services. There are many different ways to define equity for service delivery: How it is defined will substantially affect how resources are allocated.

   If equity is defined as equal satisfaction of service needs, for instance, resources should be allocated to each individual based on his or her professionally determined needs. This allocation may mean that more resources will be spent on some multiply handicapped than others because it will cost more to service their needs.

   If equity is not considereed at all, and the resources are allocated based on efficiency and effectiveness alone, the lower functioning MH students may be neglected because services provided to them are generally less effective than the services provided to the higher functionion students. Here, equity refers to equal opportunity for (artifically) equal resources.

GLOSSARY OF TERMS

duration.....The amount of time spent on educational service event.

effectiveness.....The ratio of output to outcome (ratio of hours of service to improvement in achievement).

efficiency.....The ratio of service inputs to related educational service outcomes. Per hour and per pupil cost and their relationship to achievement serve as efficiency measures.

frequency.....The number of times a service event occurs.

intensity.....The total amount of service in a given month.

linear regression.The correlational relationship of cost effectiveness, and equity to achievement.

prognostic indicators.Those variables that indicate the likelihood of successful intervention.

GLOSSARY OF TERMS

P.O.B.....Program Oriented Budget whereby each program maintains a budget which factors all resources related to the budget into it.

related educational services..Those services which are identified by statute to enable a student to benefit from special education.

weights.....A proposed five point scale for forecasting the likelihood of successful intervention.

THE MODEL--Its Parameters and Limitations

The structure of the model herein suggested is predicated upon a desire to assist administrators who have to make difficult decisions concerning the delivery of related educational services in a public school setting. Although this project specifically focuses upon the related educational services of physical therapy, occupational therapy, and speech correction in a program for orthopedically multiply handicapped youngsters, the model may be applicable in other settings. In general terms the model attempts to allocate resources (related educational services) by optimizing the student's educational improvement within a fixed amount of dollars and/or subject to other various constraints.[11]

These constraints are classified into two general categories:

1. those which deal with educational objectives; and
2. those which deal with the delivery of related educational services.

The educational objectives are delineated as those educationally functional or behavioral cluster skills in which each subpopulation must achieve a certain level of attainment.

The delivery of related educational services has three operational constraints. The first is the cost constraint which gets at the efficiency dimension in that the total amount of money spent is minimized and/or that budget lines are not exceeded. The second is the benefit constraint which gets at the effectiveness diminsion in that it relates the number of service hours and service improvement. The third constraint is that of equity which ensures that equal access and equal opportunities are provided to achievement outcome opportunities.

It must, be noted that each service constraint is particular to each service area. It must also be noted that the proposed linear model is tailored to the specific related educational services in the multiply handicapped program.

1. Allocation of Objectives

Federal and State statutes mandate that services be provided according to an appropriate educational program plan.[12] By increasing the student's intellectual, behavioral, and physical skills as per state, district, and unified program goals (as required in New Jersey PIP program planning), the individualized program of educational objectives should prepare students for a more normal living setting. Consequently, the dependent variable is student achievement. There are various standard measurement systems used to

1. Allocation of Objectives Continued

measure such various functional and behavioral objectives. The achievement of specified amount of improvement in the various functioning skills of the multiply handicapped population as measured by these systems is one consideration which an administrator considers when developing a budget.

In this proposed model one effort will be focused on the optimum amount of achievement that should be expected, on the average, for an individual in a specific subpopulation in a particular functioning skill per year. Every subpopulation is not expected to show improvement in all the objectives as measured. Instead, staff should look at an entire subpopulation profile, determine which of the each student's academic functioning skills need improvement and then set objectives for the entire subpopulation as well as each individual. The individual objectives should then be compared with those of similar students to determine if they are appropriate. Each independent variable can then be varied and the multiply regression will show the relationship that each has with achievement.

The allocation of educational objectives must be based upon intensity of educational need, three types of operational constraints to be proposed and their relationship to educational achievement.

The projected educational program objectives should be reviewed with an eye toward developing the intensity rating system as suggested in prior research recorded in the Interqual Report[13] and the Dikewood Study.[14] It has also been piloted with speech therapists in public schools in Montgomery Couny, Maryland.[15] This itensity rating system should take into account the needs pertaining to each educational objective.

TABLE I EXPECTED IMPROVEMENT IN FUNCTIONAL SKILLS

SUB-POPULATION	Toileting		Dressing		Eating		Language		Pre-reading		Pre-Quantitative		Independence		Movement		#Projected (Need) Objective		#Mastered (Attainment) Objective	
	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number

2. Constraints

The three types of proposed related services delivery constraints are as follows. The first constraint to be entered into the equation will be the cost constraint. The critical data yielded through such an analysis is unit cost data--per hour and per pupil cost. Such data is reflected in Table II.

TABLE II EDUCATIONAL COST DATA

Subpopulation	Cost/Day			Cost/Day/Therapist			Cost/Hour			Cost/Student			Level of Attainment
	PT	OT	SC	PT	OT	SC	PT	OT	SC	PT	OT	SC	

The second constraint to be entered into the multiple regression equation is the effectiveness variable. What we are seeking here is the determination of a sufficient amount of related educational services to be provided for a specific subpopulation of multiply handicapped (intensity of service)[16,17] to insure an average skill improvement in units of educational attainment (objectives). The decision variable is the frequency times the duration of service times the intensity of service per student per subpopulation per related educational services staff. This is the average effect which a designated amount of service will have on an individual student per subpopulation per month and throughout the school year.[18]

TABLE III EDUCATIONAL EFFECTIVENESS DATA

Subpopulation	Related Educational Services Provider			Total Allocation of Time			Level of Attainment
	PT	OT	SC	Frequency	Duration	Intensity	

The third type of service delivery constraint focuses upon two aggregrate weights to be assigned to each member of the subpopulation. These figures are really prognostic indicators based upon both limitations of student capacity and functions as well as service capacity and functions.[19,20] This weighting is to be done in order to address the constraint of equity. This means that the goal is one of optimizing an aggregate improvement measure for individuals within a subpopulation. Educators should keep in mind that lower functioning individuals and subpopulations are apt to be neglected unless equity objectives are carefully set and resources are appropriately allocated. This does not mean, however, that educators can ignore the assigning of prognostic weights as reality constraints.

TABLE IV EQUITY DATA

Subpopulation	Related Education Service Provider	Student Prognostic Constraint Weight	Service Prognostic Constraint Weight	Level of Attainment

STEPS IN THE IMPLEMENTATION OF THE MODEL

The formulation described above can yield two types of data. It can yield raw data which may be of interest to certain service and consumer groups (staff, parents, board members). It can also yield more accurate and objective data because of its provision for an rigorous analysis (Multiple Regression). It is strongly recommended that several tests of the model take place to check on the general availability of data and the usefulness of results for resource allocation and for program evaluations.

The Bergen County Special Services School District is in the process of developing a management information system which could test the application of the model. They have one part of the system ready for implementation, a Behavioral Cluster whcih is designed to provide outcome information. Data for the testing of this model should be available from the Behavioral Cluster, supplemented by cost estimates, and staff interviews. Additional basic data of steps is already available such as number of students, student and staff schedule.

A sequence of steps operationalizing the above model is presented below.

Step 1 Define and limit the Study Area

Rather than comparing the efficiency, effectiveness and equity of

Step 1 Define and limit the Study Area Continued

Physical Therapy, Occupational Therapy, and Speech Correction among programs throughout the District, it is suggested that a more finite study be made which is limited to the Program for the Orthopedically Multiply Handicapped.

Step 2 Identify the Related Educational Services and Their Providers

A service classification system must be developed. The related educational services should be classified into mutually exclusive and exhaustive categories based on the classifying criteria of frequency, duration, and intensity. The proposed model requires that there by service categories sufficiently detailed in order that appropriate effectiveness measures can be developed.

Step 3 Establish Objectives

Measurable objectives for a specified period for each individual student and each subpopulation are needed. The data from the Behavioral Cluster should be combined with staff judgement to arrive at a set of appropriate objectives.

Step 4 Identify the Subpopulations for Related Educational Service Allocations

The multiply handicapped groups of population has to be divided into subpopulations within which students have similar service needs. The subpopulations should be developed with the assistance of staff and should consider student needs and objectives that affect program placement. Classifying criteria and diagnostic test scores necessary for placement must have cut off points. A factor analysis will help establish subpopulations.

Step 5 Develop Efficiency Constraint Measures

The cost of providing each service must be determined. Since the model was developed for resource allocation and evaluation, measurements considering total cost per hour are desirable. Common yet relatively simple procedures for determining these unit cost factors are likely to be adequate.

Step 6 Develop Effectiveness Constraint Measures

Effectiveness measures for the different services must reflect improvements in units of attainment of particular objectives during the year. A set of measures is needed for each subpopulation. In academic developing these measures, external factors not under administrative control must be identified and factored out.

Regression analysis will be used. It ought to be recognized, however, that implementation of this model does not ensure entirely that improvements in students are due solely to the services provided.

Step 7 Develop Equity Constraint Measures

Capacity constraints for students and for related educational service providers can be obtained. The lower bound of such constraints is the minimum amount of service that can be provided while the upper bound is the point where the services becomes ineffective. If these

Step 7 Develop Equity Constraint Measures Continued

bounds cannot be determined to the satisfaction of administrators, weighting must be used to see the effect of different values on resource allocations.

Step 8 Analysis of the Data

Each recorded value will be entered on a per student, per subpopulation, and/or per related educational service provider basis. The grid will then be subjected to a multiple regression analysis.

Step 9 Interpretation and Desimination of the Result

Interpretation will be made on the basis of the extent of contribution to educational gain being made by the therapies.

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

The purpose of this presentation has been to develop a model which will assist administrators of a program for multiply handicapped in making budgeting decisions and in evaluating therapy programs. Its use requires that the efficiency and effectiveness of the various therapeutic services and providers be measured and the needs of different types of multiply handicapped with different service be identified.

The model makes two important contributions. It forces the user to collect data and perform analyses in a manner consistent with the needs for prudent resource allocation and effective program evaluation. It explicitly recognizes educational equity issues in the delivery of services to the multiple handicapped and incorporates in its structure a logical means of dealing with this matter.

It is recommended that there be a test of the varied applications of the model to determine the validity of its several significant elements of decision-making.

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